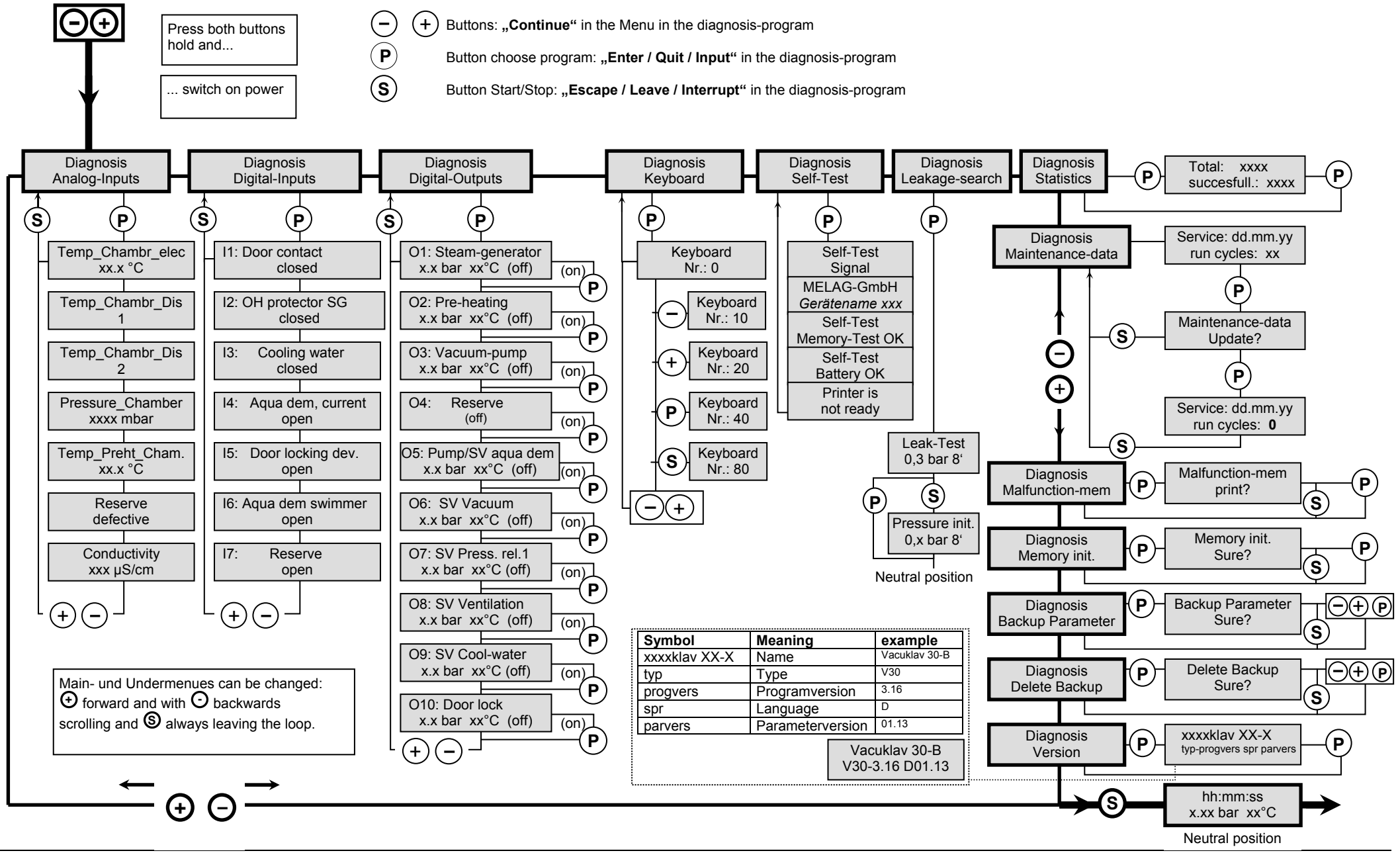
Vacuklav®23-B
Vacuklav®31-B

MELAG

Program-cycle / Diagnosis-program

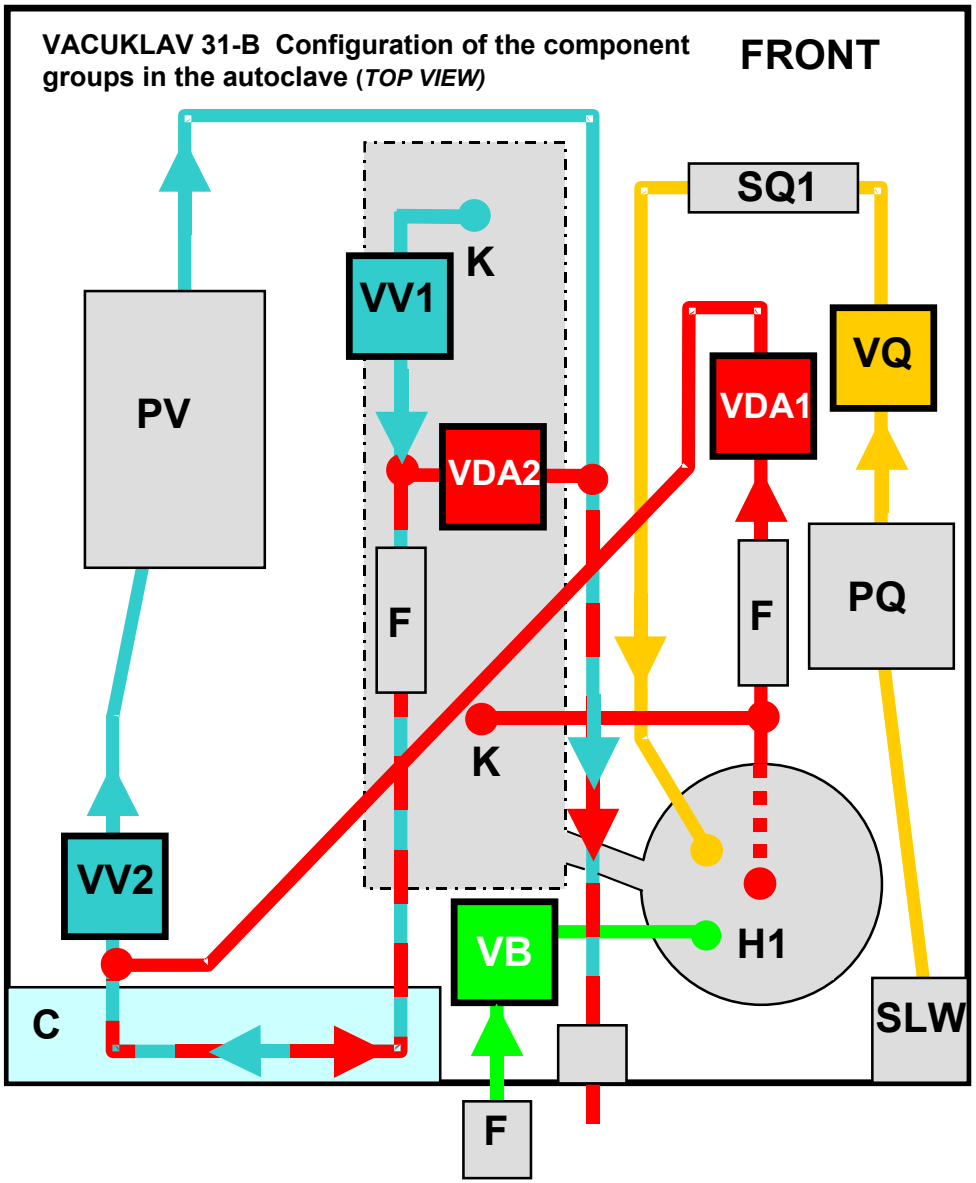
Vacuklav®: 24-B / 30-B / 31-B
Euroklav®: 23-S / 23V-S / 29-S / 29V-S


Press both buttons hold and...
... switch on power
(−) (+) Buttons: „Continue“ in the Menu in the diagnosis-program
(P) Button choose program: „Enter / Quit / Input“ in the diagnosis-program
(S) Button Start/Stop: „Escape / Leave / Interrupt“ in the diagnosis-program
Diagnosis Analog-Inputs
Temp_Chambr_elec xx.x °C
Temp_Chambr_Dis 1
Temp_Chambr_Dis 2
Pressure_Chamber xxxx mbar
Temp_Preht_Cham. xx.x °C
Reserve defective
Conductivity xxx µS/cm
Diagnosis Digital-Inputs
I1: Door contact closed
I2: OH protector SG closed
I3: Cooling water closed
I4: Aqua dem, current open
I5: Door locking dev. open
I6: Aqua dem swimmer open
I7: Reserve open
Diagnosis Digital-Outputs
O1: Steam-generator x.x bar xx°C (off)
O2: Pre-heating x.x bar xx°C (off)
O3: Vacuum-pump x.x bar xx°C (off)
O4: Reserve (off)
O5: Pump/SV aqua dem x.x bar xx°C (off)
O6: SV Vacuum x.x bar xx°C (off)
O7: SV Press. rel.1 x.x bar xx°C (off)
O8: SV Ventilation x.x bar xx°C (off)
O9: SV Cool-water x.x bar xx°C (off)
O10: Door lock x.x bar xx°C (off)
(on)
Diagnosis Keyboard
Keyboard Nr.: 0
Keyboard Nr.: 10
Keyboard Nr.: 20
Keyboard Nr.: 40
Keyboard Nr.: 80
Diagnosis Self-Test
Self-Test Signal
MELAG-GmbH Gerätename xxx
Self-Test Memory-Test OK
Self-Test Battery OK
Printer is not ready
Diagnosis Leakage-search
Leak-Test 0,3 bar 8‘
Pressure init. 0,x bar 8‘
Neutral position
Diagnosis Statistics
Total: xxxx succesfull.: xxxx
Diagnosis Maintenance-data
Service: dd.mm.yy run cycles: xx
Maintenance-data Update?
Service: dd.mm.yy run cycles: 0
Diagnosis Malfunction-mem
Malfunction-mem print?
Diagnosis Memory init.
Memory init. Sure?
Diagnosis Backup Parameter
Backup Parameter Sure?
Diagnosis Delete Backup
Delete Backup Sure?
Diagnosis Version
xxxxklav XX-X typ-progvers spr parvers
hh:mm:ss x.xx bar xx°C
Neutral position
Main- und Undermenues can be changed:
(+) forward and with (-) backwards scrolling and (S) always leaving the loop.

Symbol	Meaning	example
xxxxklav XX-X	Name	Vacuklav 30-B
typ	Type	V30
progvers	Programversion	3.16
spr	Language	D
parvers	Parameterversion	01.13

Vacuklav 30-B
V30-3.16 D01.13

CONFIGURATION OFCOMPONENT GROUPS IN THE AUTOCLAVE
ERROR 1 VACUUM UNIT



The actual piping plan is contained in Drawing No. 31B-010.
This overview shows a rough schematic of the spatial configuration of the component groups, pipes, and hoses, in the Vacuklav® 31-B. The following error descriptions will refer to this overview to help you find the component groups to be checked.

Item	Bezeichnung	Description	State of valve when no current is applied (dead)	ACOUT (power output)
C	Kühler	cooler		4
F	Filter	filter		
H 1	Dampferzeuger	steam generator		1
K	Kessel	vessel		
P Q	Pumpe aqua dest	pump for distilled water		5
P V	Vakuumpumpe	vacuum pump		3
S LW	Sensor Leitwert	sensor for conductivity		
S Q1	Strömungswächter	flow sensor for dist. water		
V	Ventil (Magnet~)	valve (solenoid)		
V B	Belüftung	ventilation	*open*	8
V DA1	Druckablaß 1	pressure release 1	*closed*	7
V DA2	Druckablaß 2	pressure release 2	*closed*	9
V Q	Speisewasser aqua dest	feed water (distilled)	*closed*	5
V V1	Vakuum 1	vacuum 1	*closed*	6
V V2	Vakuum 2	vacuum 2	*closed*	6

Tripping conditions:

Fault conditions may occur if the monitoring time **Uet1** was exceeded for achievement of the following:

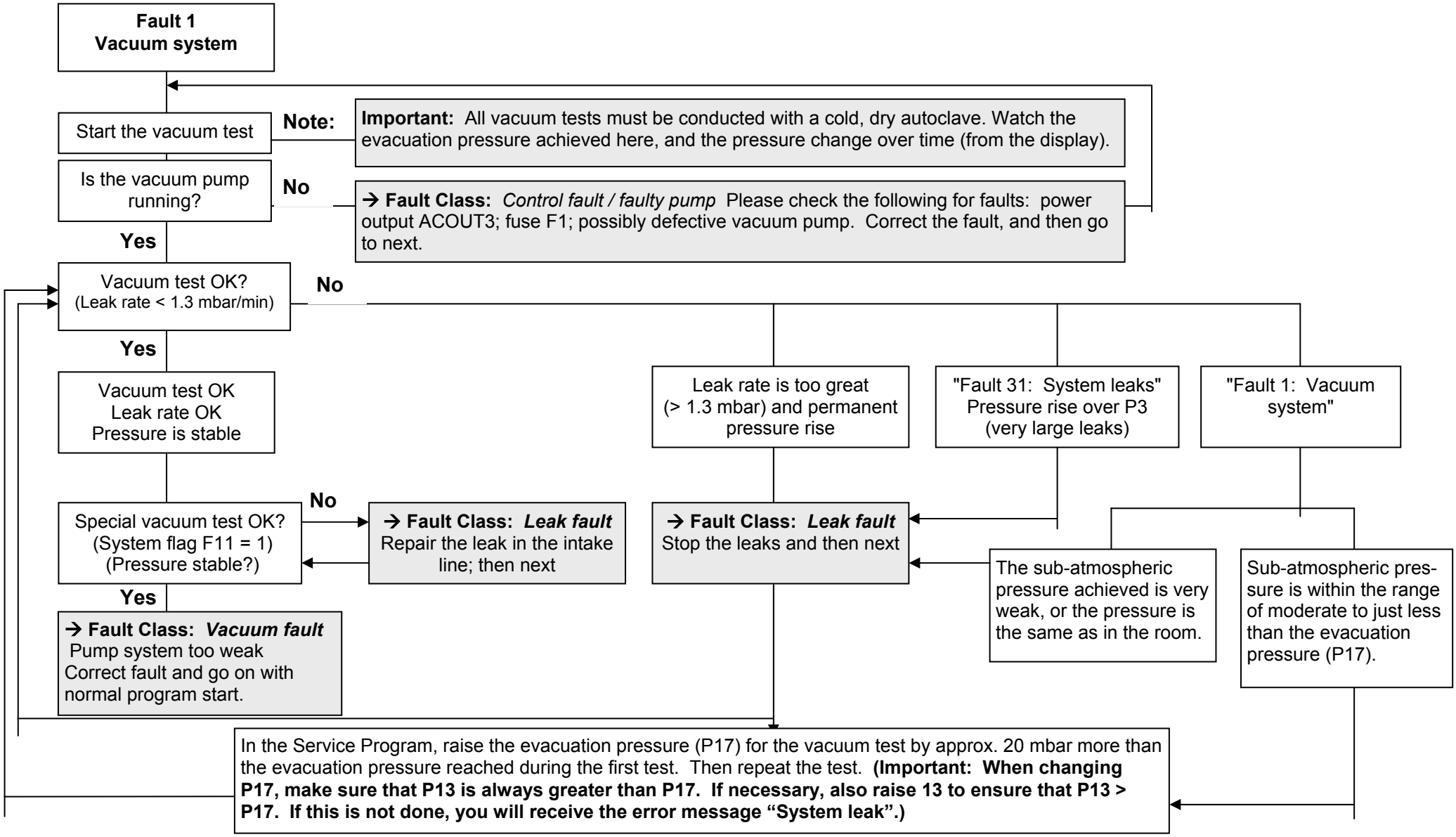
- The required evacuation pressures for the individual sub-atmospheric pulses
  - P37, P38, P40, P41 for cold starts
  - P1, P2, P21, P22 for hot starts
- The required evacuation pressure (P17) for the vacuum test
- The required evacuation pressure (P12) for evacuation / pressure relief
- The required minimum pressure for drying (P3).

Causes of the problem / Correction of the problem

Action / checking by operating staff:

- Check for defects and for soiling of the door seal and the sealing surfaces of the sterilization chamber, and on the round plate around the door of the sterilization chamber. Repair and clean if necessary.
- Check to make sure that the autoclave is properly set up (it must be installed with a tilt (at slope), as described in the operating instructions).
- Check to make sure that the condensate drain at the bottom of the sterilization chamber is not stopped. It can be stopped if instruments, filter paper, etc. fall onto the bottom of the chamber.
- Check for the following:
  - If you are using the internal system for supply of demineralised water, check to make sure that the pressure-release pipe is not stopped.
  - If you are using an external waste-water connection that empties into the building waste-water system, check to make sure that this drain pipe does not have a kink (make sure the water can flow freely out).

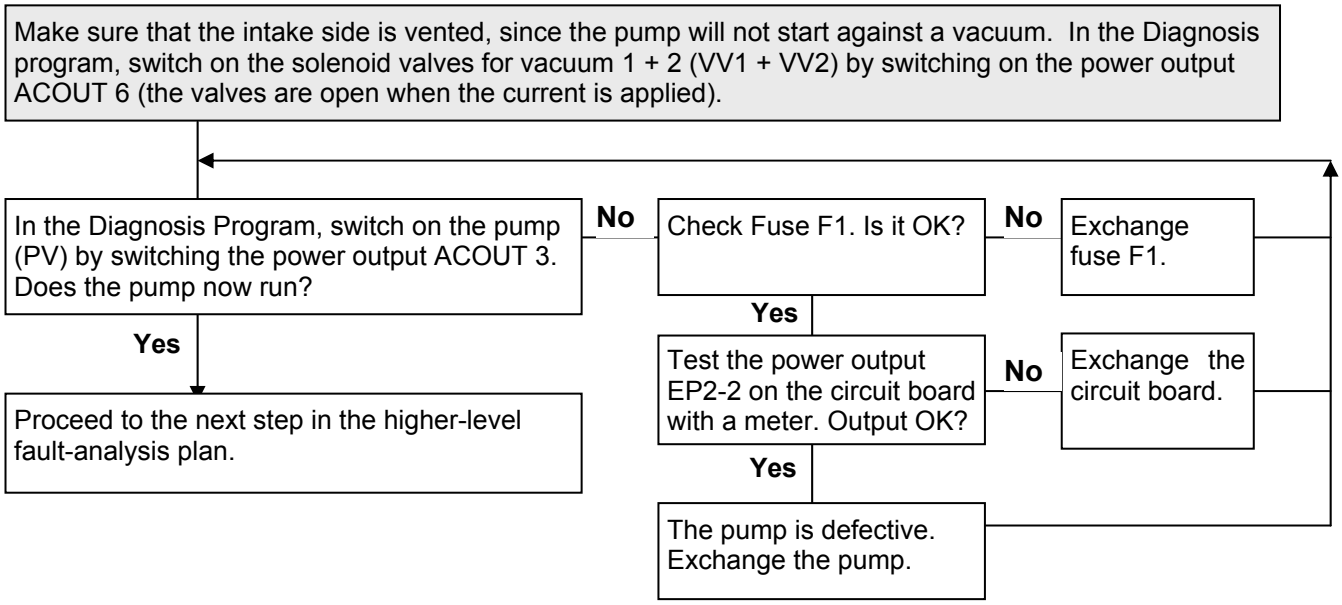
Faults in the autoclave / Correction of faults by technical service personnel


Fault 1
Vacuum system
Start the vacuum test
Note:
Important: All vacuum tests must be conducted with a cold, dry autoclave. Watch the evacuation pressure achieved here, and the pressure change over time (from the display).
Is the vacuum pump running?
No
→ Fault Class: Control fault / faulty pump Please check the following for faults: power output ACOUT3; fuse F1; possibly defective vacuum pump. Correct the fault, and then go to next.
Yes
Vacuum test OK?
(Leak rate < 1.3 mbar/min)
No
Yes
Vacuum test OK
Leak rate OK
Pressure is stable
Leak rate is too great
(> 1.3 mbar) and permanent pressure rise
"Fault 31: System leaks"
Pressure rise over P3
(very large leaks)
"Fault 1: Vacuum system"
Special vacuum test OK?
(System flag F11 = 1)
(Pressure stable?)
No
→ Fault Class: Leak fault
Repair the leak in the intake line; then next
→ Fault Class: Leak fault
Stop the leaks and then next
The sub-atmospheric pressure achieved is very weak, or the pressure is the same as in the room.
Sub-atmospheric pressure is within the range of moderate to just less than the evacuation pressure (P17).
Yes
→ Fault Class: Vacuum fault
Pump system too weak
Correct fault and go on with normal program start.
In the Service Program, raise the evacuation pressure (P17) for the vacuum test by approx. 20 mbar more than the evacuation pressure reached during the first test. Then repeat the test. (Important: When changing P17, make sure that P13 is always greater than P17. If necessary, also raise 13 to ensure that P13 > P17. If this is not done, you will receive the error message "System leak".)

Fault 1: Vacuum system

→ Fault class: Fault in control system or function of the pump

You can check the input voltage for the vacuum pump, as well as the function of the pump, as follows:


Make sure that the intake side is vented, since the pump will not start against a vacuum. In the Diagnosis program, switch on the solenoid valves for vacuum 1 + 2 (VV1 + VV2) by switching on the power output ACOUT 6 (the valves are open when the current is applied).
In the Diagnosis Program, switch on the pump (PV) by switching the power output ACOUT 3. Does the pump now run?
No
Check Fuse F1. Is it OK?
No
Exchange fuse F1.
Yes
Yes
Proceed to the next step in the higher-level fault-analysis plan.
Test the power output EP2-2 on the circuit board with a meter. Output OK?
No
Exchange the circuit board.
Yes
The pump is defective. Exchange the pump.

→ Fault class: the vacuum performance of the pump system is too weak

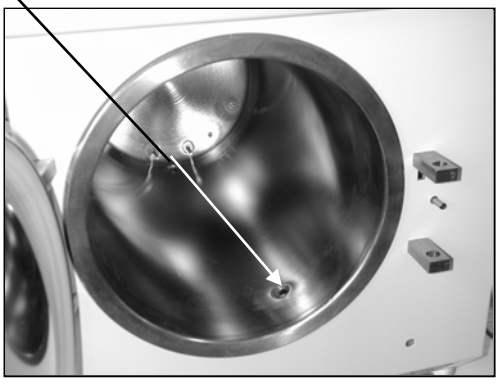
► The vacuum solenoid valves 1 + 2 do not open (VV1, VV2)

- The solenoid valve, or coil, or rectifier plug are defective.
- The activation for the solenoid valve (output 6) is defective.

Switch on output 6 in the Diagnosis program.
Check the electric control system and the switching behavior of the solenoid valve.

► The flow resistance in the intake line is too high

- Filter in the intake fitting on the sterilization chamber is clogged up



► The pressure-sensor signal is defective, or the processing of this signal is not correct

- The level of the pressure-sensor signal, or the signal processing, is too high. See the section “Sensor Fault Group”.

► The suction of the vacuum pump is too weak

Check the vacuum performance of the membrane as follows:

1. Check to see if there are leaks.
2. Make sure that the chamber to be evacuated is empty and dry.
3. If there are no leaks, and if the chamber is empty and dry, check the performance of the pump. It must be at least 800 mbar in 80 s, or 900 mbar in 180 s.
4. If there are no leaks, and if the chamber is empty and dry, and if the performance of the pump does not meet the above level (800 mbar in 80 s, or 900 mbar in 180 s), then exchange the pump.

Fault 1: Vacuum system

Fault class: leakages

Leaks in the solenoid valves

► The solenoid valve for the venting (VB) will not close, or it leaks
- Check the coil, the rectifier plug, and the control at output 8
- Solenoid valve dirty. Check the plunger / is the seating tight?

Test under sub-atmospheric conditions (Vacuum Test program)
Remove the sterile filter. Cover the opening of the sterile-filter fitting with the palm of your hand. Then observe the pressure reading.

► The solenoid valve for pressure release 1 + 2 (VDA1, VDA2) has a leak
- Solenoid valve dirty. Check the plunger / is the seating tight?

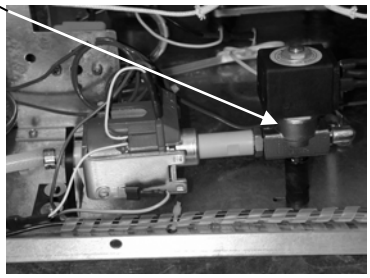
Test under sub-atmospheric conditions (Vacuum Test program)
Observe the water column in the hose between the solenoid valve “Pressure release” and the sterile filter. If there is a leak, water will be pulled in the direction of the solenoid valve.
Loosen the hose on the T-fitting for the cooling-water drain, close with finger, observe the pressure reading.

► The solenoid valve for the vacuum 1 + 2 (VV1 + VV2) has a leak (Vacuum Test program)
- Solenoid valve dirty. Check the plunger / is the seating tight?

Test under sub-atmospheric conditions (Vacuum Test program):
Observe the water column in the hose between the intake fitting for the chamber and the solenoid valve for the vacuum. If there is a leak, water will be pulled in the direction of the solenoid valve.

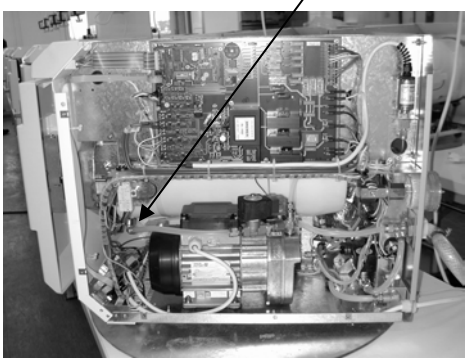
► The solenoid valve for the feed pump (VQ) has a leak
- Solenoid valve dirty. Check the plunger / is the seating tight?

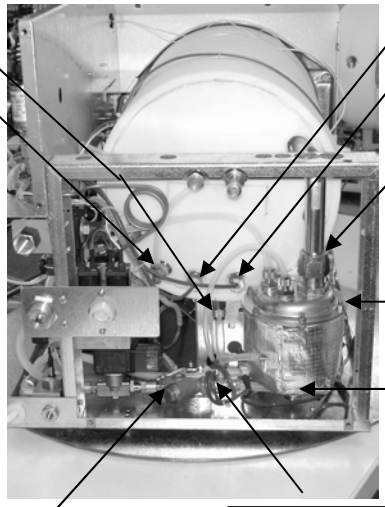
Test under sub-atmospheric conditions (Vacuum Test program):
Observe the water column in the intake hose leading to the input of feed water between the conductivity-sensor and the intake fittings of the pump, and on the pressure side of the pump. If there is a leak, water will be pulled in the direction of the solenoid valve.



Leaks at the threaded connections and adhesive bonding

Test under sub-atmospheric conditions: start the “Leak search” procedure in the Diagnosis Program (0.3 bar, for 8 min). Or, feed compressed air into the autoclave through the vent-filter fittings (in Diagnosis program, close output 8, “MV vent”). Brush a soapy solution on the points shown below and check to see if there are any air bubbles.





Adhesive-bonded threaded hose connections at the chamber

Threaded connections for temperature sensor

Cutting-ring threaded connection for steam generator / chamber

Cover seal for steam generator

Swivelled threaded connection for the steam generator

Plug of the pressure-release filter

Adhesive bond for the T-fitting in the pressure-release filter

FAULT 2: Steam generator

Triggered by :

The following monitoring time limits have been exceeded

- Uet2 for the warming-up phases in the fractionations until reaching P5 (warm start), P39 (cold start), P43 (cold start disinfection) or
- Uet3 for the heating up to the sterilization / disinfection temperature T1-T5

Causes / Remedy

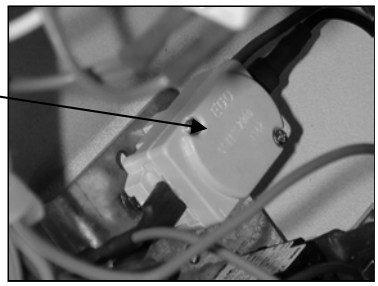
Operating fault / Checks by personnel:

- Maximum load exceeded
- Mains power voltage too low (check mains installation)

Appliance fault / Repair by technical service personnel

► Control steam generator Output ACOUT1 faulty

⇨ check in "Diagnosis Program":
Switch on ACOUT1, (the LED for this output lights up),
Measure voltage at output ACOUT1



► Capillary control "2nd Overheating protection for the Steam Generator" is faulty

- Control unit is permanently open

⇨ Check for passage when cold

- Control unit switches too soon

⇨ During a program, measure the voltage behind the control unit with a sufficient water level in the steam generator (check level in the condensate return) the control unit must not switch

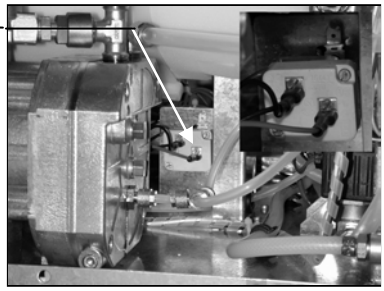
► "3rd Overheating protection for the Steam Generator" fuse blown on the heating coil of the steam generator (contact broken)

⇨ Measure voltage behind fuse, this will usually be due to a fault at the output ACOUT1 of the control unit and additionally failure of the 2nd overheating protection

► Heating Steam Generator faulty

⇨ In the Diagnosis Program switch on output ACOUT1, measure voltage directly at the connectors of the heating coil of the steam generator (voltage measured but coil remains cold)

► Capillary level control unit faulty



- Control unit does not open on overheating (water shortage). Water shortage is not recognised and the overheating protection switch switches off.

⇨ Functional test of the capillary level control unit:
In the "Service Program“/ "switch-times" set z24 = 0,
Start Universal Program with full load, by switching capillary control unit and the resultant feed of distilled/demineralized feed water should compensate for the water shortage in the steam generator (observe condensation return to steam generator)

► Pressure sensor-Signal/ Signal processing faulty

- Pressure sensor signal or the signal processing too low

⇨ Steam generator heats until security-valve opens)

FAULT 6: Ventilation

Triggered by: The monitoring time limit Uet7 for the ventilation of the chamber until reaching pressure P12 was exceeded

Causes/ Remedy

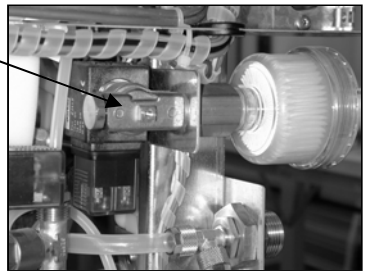
Operating fault/Check by personnel:

- The sterile filter is dirty, this will the autoclave show with the display “Replace sterile filter”

⇨ As a check, remove the filter and carry out a sterilization cycle with no load. Exchange sterile filter

Appliance fault / Repair by technical service personnel

► Ventilation solenoid valve does not open



- Solenoid valve blocked mechanically (soiling)

⇨ Open valve casing, clean or exchange valve

- Control for ventilation solenoid valve faulty, output ACOUT8 giving permanent signal (relay stuck)

⇨ Exchange CPU-board

► Pressure sensor/ Analog input AIN 3 measures too low

- Pressure sensor signal/ Signal processing to control too low, Pressure signal after ventilation still < P12, follow up fault would normally be “Fault 35: Sterilization TO”

⇨ Check that the pressure displayed in “Diagnosis-Program“/ “Analog input“ is plausible, displayed value should be current air pressure (door open)

⇨ See also under “Fault 35 Sterilization TO“ – “Pressure sensor, analog input AIN 3 measures too low“

Exchange pressure sensor
If a fault is still reported: Exchange CPU-board

► Parameter P12 wrong

⇨ In “Service Program“ check that the parameter setting P12 = 800 is correct, if necessary update setting (particularly for Vacuklav 24 and for installation at high altitudes).

FAULT 9: DOOR OPEN

Triggered by: Door contact (digital input DIN1) was closed during a program

Causes/ Remedy

Operating fault/ Checks by personnel:

- Press down door handle as far as possible

Appliance fault / Repair by technical service personnel

► **Door switch faulty**

- Door switch faulty / needs readjustment
- Electrical connection to CPU-board interrupted
- Digital input DIN1 on CPU-board faulty

⇨ Check in the MELAG- Diagnosis-Program, "Digital Inputs: E 1“ it the door switch needs adjusting, see below.

Adjusting the door contact switch

- In the diagnosis program "Digital Inputs“ select "Input E1: Door contact“
- Insert 8 mm spacer (M8 bolt or similar) between lock housing and upper door beam as shown
- Close door and push down door lock until contact is made
- Loosen right fixing screw of door contact switch
- Turn door contact switch around the left fixing screw until door contact switch engages (Display shows "closed", switching sound)
- Tighten right adjusting screw in new position

FAULT 12 : Door locking

Triggered by:

- The door locking contact DIN5 is not switched after time period z31 (Door closed when no power supply, contact DIN5 still open).

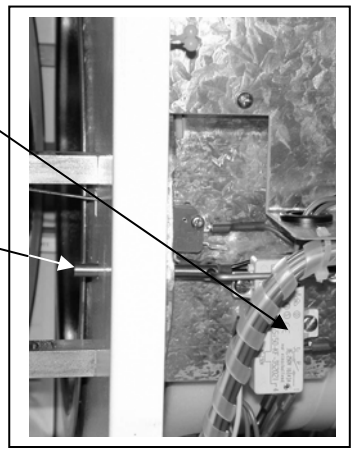
Causes / Remedy:

Operating fault / Check by operating personnel :

- Locking bolt sticking or out of alignment

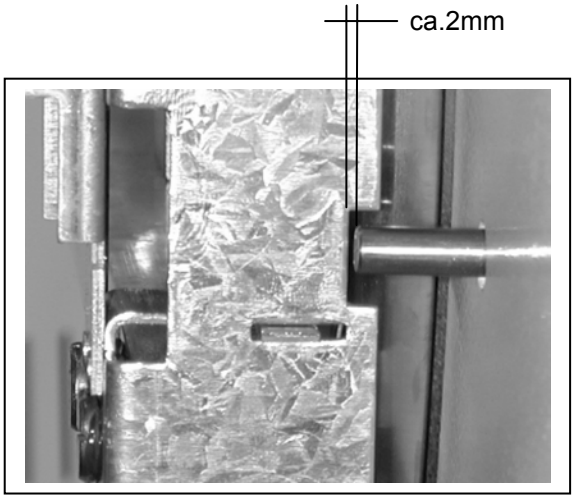
Appliance fault / repair by technical service personnel:

- Control for door locking output ACOUT 10 on CPU-board is faulty (permanent voltage)
- Contact switch on door lock is faulty
- Locking bolt cannot move freely / is blocked



Adjusting the door lock

- Dismantle door cladding, close door
- Loosen fixing screws on the door lock
- By shifting the door lock centralise the face of the locking bolt in the depression as shown, with a spacing of approx. 2 mm
- Tighten fixing screws on the door lock



Door lock will not disengage

The Display permanently shows "Please wait - Door unlocking" after switching power on or after a program has ended (no explicit malfunction reported):

- Control "Door locking" Output ACOUT 10 on CPU-board is faulty
- Drive for the door locking is faulty
- Door contact switch of the door lock is faulty
- Locking bolt cannot move freely / is blocked

⇨ In the MELAG Diagnosis Program switch on output ACOUT10, functional control power output and locking Unlock door manually (for example with the help of a screwdriver).

FAULT18 : Sensor "nr" Input "nr"

Triggered by:

- The internal check of the sensors for temperature, pressure, or conductivity showed too large deviations. Such malfunction reports can occur immediately when the appliance is switched on or while a program is running.

Causes / Remedy

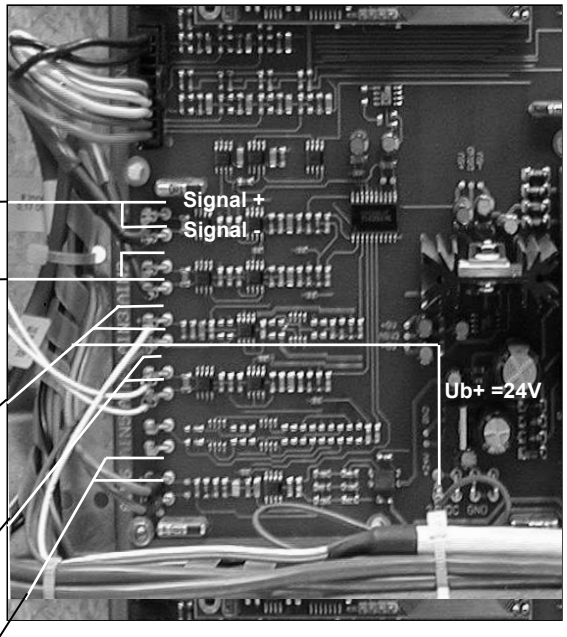
Operating fault / Checks by personnel:

For "Fault 18 Sensor: 6 Input 6" (conductivity sensor is faulty), check first that if demineralized or distilled water is supplied from a container that this has not accidentally been filled with something else.

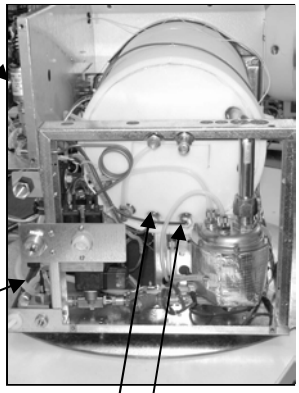
Appliance fault/ Repair by technical service personnel

Overview of sensors / analog inputs

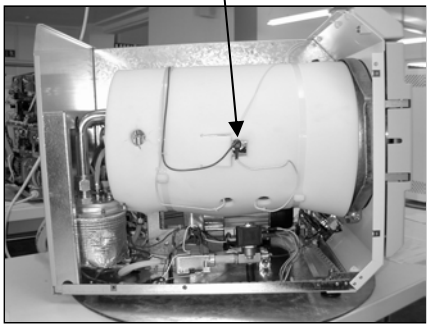
Sensor No.	Input No.	Sensor-characteristic	Sensor designation/ -function
1	AIN1	PT 1000 Class A	"Temp_chambr_elec“ Temperature sensor "Steam" for program control
2	AIN2	PT 1000 Class A	"Temp_Chambr_Dis1/2“ Temperature sensor "Steam" for display/record and monitoring
3	AIN3	Pressure sensor 0 - 10V at 0 - 4000mbar	"Pressure chamber“ Pressure sensor for program control Display, record and monitoring
4	AIN4	PT 1000 Class A	"Temp_preht_chamb“ Temperature sensor for control of chamber temperature
6	AIN6	Water conductivity sensor	"Conductivity“ display/ monitoring elec. conductivity



Pressure sensor AIN 3



Temperature sensor preheating, AIN4



Conductivity sensor, AIN6

Temperature sensors Steam AIN1/AIN2

Display message	Triggered by/Cause	Correction	Comments / Remarks
Fault18 Sensor: 1 Input 1	Temperature at analog input AIN1 ≤ 0°C or ≥ T23 • Temperature sensor faulty Short-circuit/Open • Signal processing on CPU-board faulty	• Exchange temperature sensor • Exchange CPU-board	Until the sensor/CPU-board can be exchanged, in the MELAG Service-program set FLAG F28 to 1, AIN 2 then takes over the function of AIN 1
Fault18 Sensor: 2 Input 2	Temperature measured at analog input AIN2 ≤ 0°C or ≥ T23 • Temperature sensor faulty Short-circuit/Open • Signal processing on CPU-board faulty	• Exchange temperature sensor • Exchange CPU-board	Until the exchange of the sensor/CPU-board, unplug the defective sensor on input AIN2, move the sensor on AIN1 to AIN2 and in the MELAG-Service-Program set F28 to 1
Fault18 Sensor: 3 Input 3	Pressure measured to analog input AIN3 ≤ 0 mbar or ≥ P19 • Pressure sensor faulty • Signal processing to CPU-board faulty • + 24V (voltage to pressure sensor) at CPU-board faulty	• Exchange pressure sensor • Exchange CPU-board	Sequence of testing: +24V supply (between GND and +UB) measured at pressure sensor Signal voltage at pressure sensor between GND and + Signal must be around 2.5V (corresponds 1000mbar air pressure)
Fault18 Sensor: 4 Input 4	Temperature measured at analog input AIN4 ≤ 0°C or ≥ T23 • Temperature sensor faulty Short-circuit/Open • Signal processing on CPU-board faulty	• Exchange temperature sensor • Exchange CPU-board	Until exchange of the sensor/CPU-board, in the MELAG- Service program set FLAG F5 to 0, this deactivates the entire preheating including malfunction reports - drying quality will be reduced
Fault18 Sensor: 6 Input 6	Conductivity measured at analog input AIN6 ≥ L3	• Check for short-circuits of the conductivity sensor • Exchange CPU-board	Until exchange of the CPU-board, in the MELAG-Service program set FLAG F3 to 0, this deactivates the entire conductivity measurement including malfunction reports - temporarily no automatic checks of water quality ,

FAULT 21 Preheating

Triggered by :

The monitoring time limit Uet11-Uet16 from switching on the preheating until reaching the necessary temperature has been exceeded

Causes/ Remedy

Operating fault/Checks by personnel :

- Mains electricity voltage too low: Check mains supply installations
- Appliance is cold, door not closed properly during preheating

Appliance fault / Repair by technical service personnel

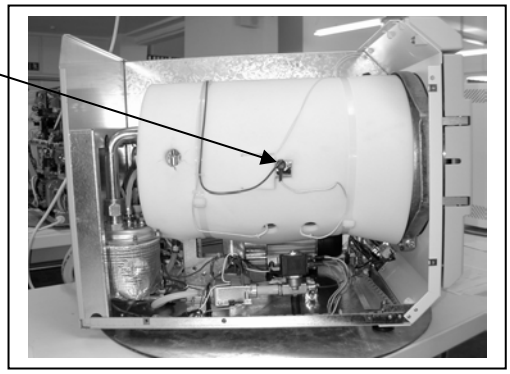
► Control unit Preheating Output ACOUT2 is faulty

⇨ Check in "MELAG Diagnosis-Program":
Switch on output ACOUT 2, (the LED for this output lights up),
Measure voltage at output ACOUT2

► Overheating-protection Preheating faulty

- Control unit permanently open
- Control unit switches too soon, and stops heating power:

⇨ Measure voltage behind the control unit during the program



► Preheating faulty

⇨ In the "MELAG diagnosis program" switch on output ACOUT2, measure voltage directly at the connection to the preheating (voltage but heating remains cold), or check current through heating

⇨ Until a repair is possible, as a temporary measure set the FLAGS F5=0 to deactivate the preheating and the associated malfunction report .

FAULT 22: Overheating of preheating

Triggered by :
The limit value for the preheating-temperature T10 was exceeded

Causes / Remedy

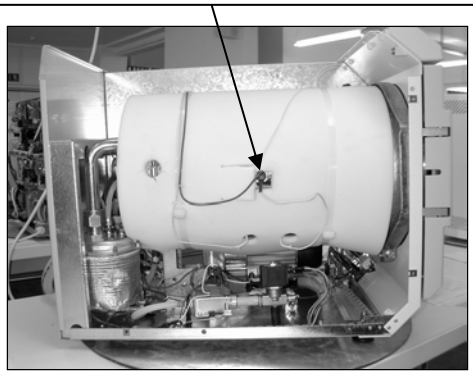
Operating faults / Checks by personnel:

Appliance fault / Repair by technical service personnel

► Control of Pre-heating Output ACOUT2 faulty
⇨ At output ACOUT2 there is a permanent voltage (although LED off), i.e. semiconductor relay faulty, exchange CPU board

► Temperature sensor Pre-heating faulty
⇨ Temp.-sensor Preheating measurements too high/fluctuating, in the "MELAG Diagnosis Program" check the analog input AIN4 during a program by pressing the button " - ".
Exchange temperature sensor

Temp.-sensor "Preheating" AIN4
Under the chamber insulation, stuck directly on the heating



► Signal processing at analog input AIN4 faulty
⇨ Exchange CPU-board

⇨ Until a repair, it is possible to temporarily deactivate the preheating and the malfunction message by setting the FLAG F5=0, and in addition if the output ACOUT2 is defective, disconnect the contacts to the pre-heating from the output.

FAULT 26: A/D-converter

Triggered by:
The maximum permissible deviation for the signal processing in the CPU (A/D-conversion) was exceeded

Causes/ Remedy

Operating faulty/Checks by operating personnel:

Appliance fault / Repair by technical service personnel

► **Hardware signal processing fault**
⇨ Exchange CPU-board

FAULT 29: Battery RAM

Triggered by :

In the data memory of the CPU there is a data inconsistency or a loss of data, This can be due to an electrical disturbance (e.g. very high power supply disturbances), a low battery voltage or a hardware defect in the RAM. On quitting the fault the clock time is automatically set at 00:00 and the load counter is reset to the value from the EEPROM. At the same time all record data in the memory is deleted.

Causes / Remedy

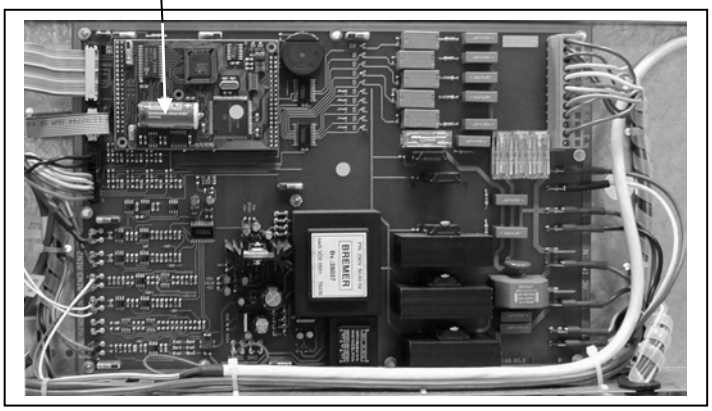
Operating fault / Checks by personnel:

- After quitting the malfunction report : Enter correct time and date settings and restart a program.

Appliance fault / Repair by technical service personnel

► Battery voltage too low

⇨ • If fault occurs regularly exchange battery on CPU- board (battery connections soldered)



► Fault in RAM

⇨ • If after exchanging the battery there is still a malfunction report, then there is a permanent fault in the RAM - replace the CPU board

FAULT 34: Sterilization TU

Triggered by:
Temperature fell below the minimum level for the sterilization/disinfection during the period T1-T5 (measured at the temperature sensor "Temp_chambr_elec“ at AIN1).

Cause / Remedy

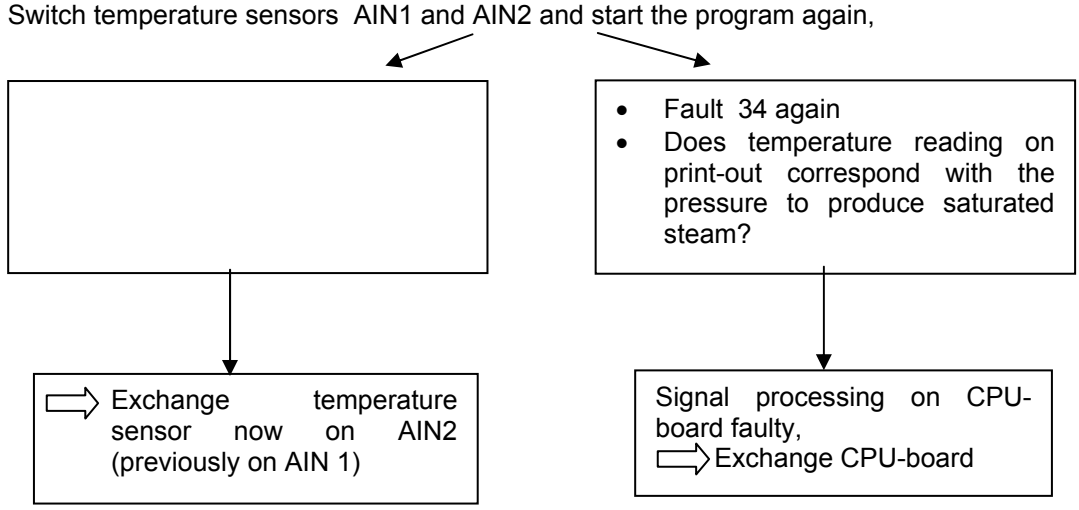
Operating fault / Checks by personnel:
- Load exceeds maximum level allowed

Appliance fault / Repair by technical service

► No saturated steam pressure / Leaking
As a result of too much residual air in the autoclave chamber, the temperature is not high enough to allow the generation of saturated steam.
Check using the print-out records:
Control pressure in record corresponds to control pressures P 6 – P10
Reading in record from temperature sensor "Temp_Chamber_Dis1/2" at Analog input AIN2 is also too low (corresponds to the temperature of temperature sensor "Temp_chambr_elec" at analog input AIN1 (see last line of record print-out.)

⇨ Carry out a vacuum test - if there is no leaking see under "Pressure sensor signal too high"

► Temperature sensor "Temp_Kess_Prog"/ Analog input AIN1 measures too low
⇨ Check using the record print-out:
Print-out reading for control pressure corresponds to control pressures P 6 – P10
Print-out reading for temperature sensor "Temp_Chamber_Dis1/2“ at analog input corresponds with the pressure required for saturated steam.
In order to determine whether the fault lies in the temperature sensor or the signal processing on the CPU-board, proceed as follows:


Switch temperature sensors AIN1 and AIN2 and start the program again,
• Fault 34 again
• Does temperature reading on print-out correspond with the pressure to produce saturated steam?
⇨ Exchange temperature sensor now on AIN2 (previously on AIN 1)
Signal processing on CPU-board faulty,
⇨ Exchange CPU-board

► Pressure sensor / Analog input AIN 3 measures too high

If the checks show there is no leak (Vacuum test), check through the following on the program print-out:

⇨ Pressure reading on print-out corresponds to the control pressures P 6 – P10

Print-out readings from temperature sensor "Temp_chambr_elec“ (AIN1) and from temperature sensor "Temp_Chamber_Dis1/2“ (AIN2) correspond to one another, but both are too low to produce saturated stream.

- Exchange pressure sensor
- If there is still a fault, exchange the CPU-board

► "Overheating protection - Steam generator" engages

- Capillary tube level control (digital input DIN 2) is faulty

  Control does not open on overheating (shortage of water), water shortage is therefore not recognised and the capillary tube overheating control switches off.

  (see also "Fault 2 Steam generator“)

⇨ Observe level regulation in the condensation return pipe, exchange steam generator

- Capillary tube overheating control is faulty.

  Control switches too soon, exchange steam generator

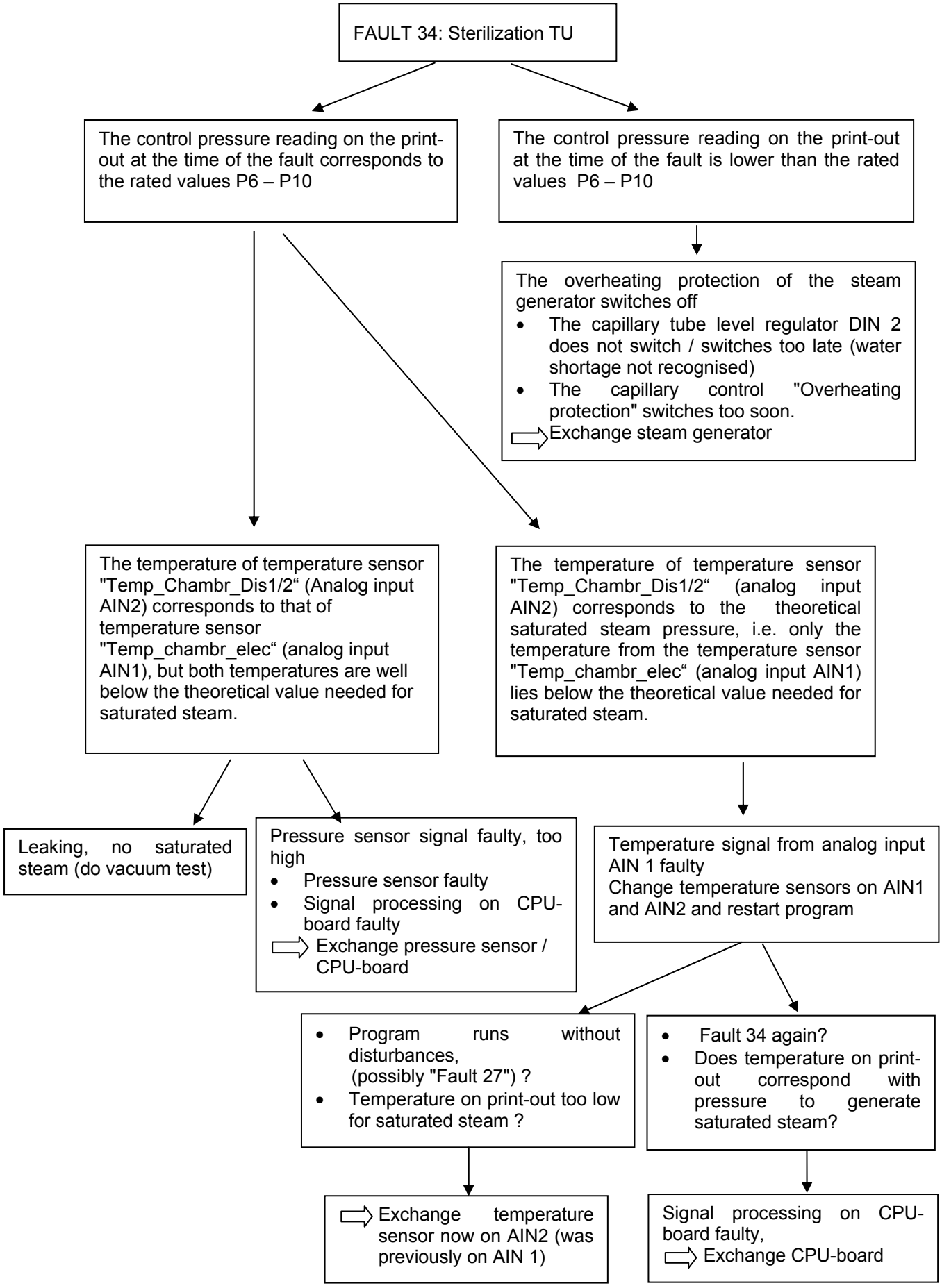
⇨ Observe level regulation in the condensation return pipe, exchange steam generator

► "Poor control response of steam generator"

Poor heat transmission from the heating coil of the steam generator, particularly temperature fluctuations on transition from warming-up phase to sterilization phase can take the temperature below the sterilization temperature for brief periods

⇨ Exchange steam generator

Fault diagnosis using the program print-out


FAULT 34: Sterilization TU
The control pressure reading on the print-out at the time of the fault corresponds to the rated values P6 – P10
The control pressure reading on the print-out at the time of the fault is lower than the rated values P6 – P10
The overheating protection of the steam generator switches off
• The capillary tube level regulator DIN 2 does not switch / switches too late (water shortage not recognised)
• The capillary control "Overheating protection" switches too soon.
⇨ Exchange steam generator
The temperature of temperature sensor "Temp_Chambr_Dis1/2“ (Analog input AIN2) corresponds to that of temperature sensor "Temp_chambr_elec“ (analog input AIN1), but both temperatures are well below the theoretical value needed for saturated steam.
The temperature of temperature sensor "Temp_Chambr_Dis1/2“ (analog input AIN2) corresponds to the theoretical saturated steam pressure, i.e. only the temperature from the temperature sensor "Temp_chambr_elec“ (analog input AIN1) lies below the theoretical value needed for saturated steam.
Leaking, no saturated steam (do vacuum test)
Pressure sensor signal faulty, too high
• Pressure sensor faulty
• Signal processing on CPU-board faulty
⇨ Exchange pressure sensor / CPU-board
Temperature signal from analog input AIN 1 faulty
Change temperature sensors on AIN1 and AIN2 and restart program
• Program runs without disturbances, (possibly "Fault 27") ?
• Temperature on print-out too low for saturated steam ?
• Fault 34 again?
• Does temperature on print-out correspond with pressure to generate saturated steam?
⇨ Exchange temperature sensor now on AIN2 (was previously on AIN 1)
Signal processing on CPU-board faulty,
⇨ Exchange CPU-board

FAULT 35: Sterilization TO

Triggered by :

The maximum temperature (T1-T5)+D5 for the sterilization / disinfection during the period T1-T5 (measured by the temperature sensor "Temp_chambr_elec“ at AIN1) has been exceeded

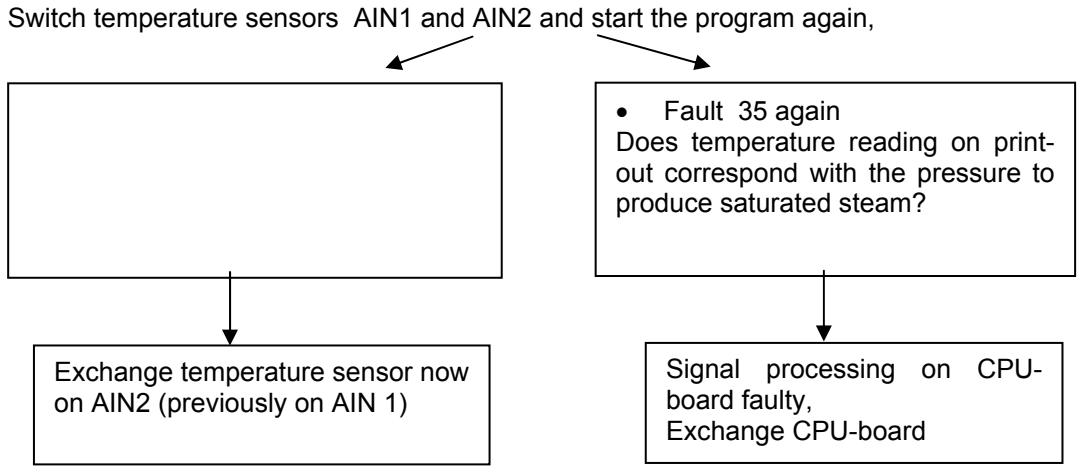
Cause / Remedy

Operating fault / Checks by personnel:

Appliance fault / Repair by technical service

► Temperature sensor "Temp_Kess_Prog"/ Analog input AIN1 measures too high

⇨ Check using the record print-out:
Print-out reading for control pressure corresponds to control pressures P 6 – P10
Print-out reading for temperature sensor "Temp_Chambr_Dis1/2“ at analog input corresponds with the pressure required for saturated steam.
In order to determine whether the fault lies in the temperature sensor or the signal processing on the CPU-board, proceed as follows:


Switch temperature sensors AIN1 and AIN2 and start the program again,
• Fault 35 again
Does temperature reading on print-out correspond with the pressure to produce saturated steam?
Exchange temperature sensor now on AIN2 (previously on AIN 1)
Signal processing on CPU-board faulty,
Exchange CPU-board

► Pressure sensor / Analog input AIN 3 measures too low

Check using the program print-out records:
⇨ Pressure reading on print-out corresponds to the control pressures P 6 – P10
Print-out readings from temperature sensor "Temp_chambr_elec“ (AIN1) and from temperature sensor "Temp_Chambr_Dis1/2“ (AIN2) correspond to one another, but both are too high to produce saturated stream

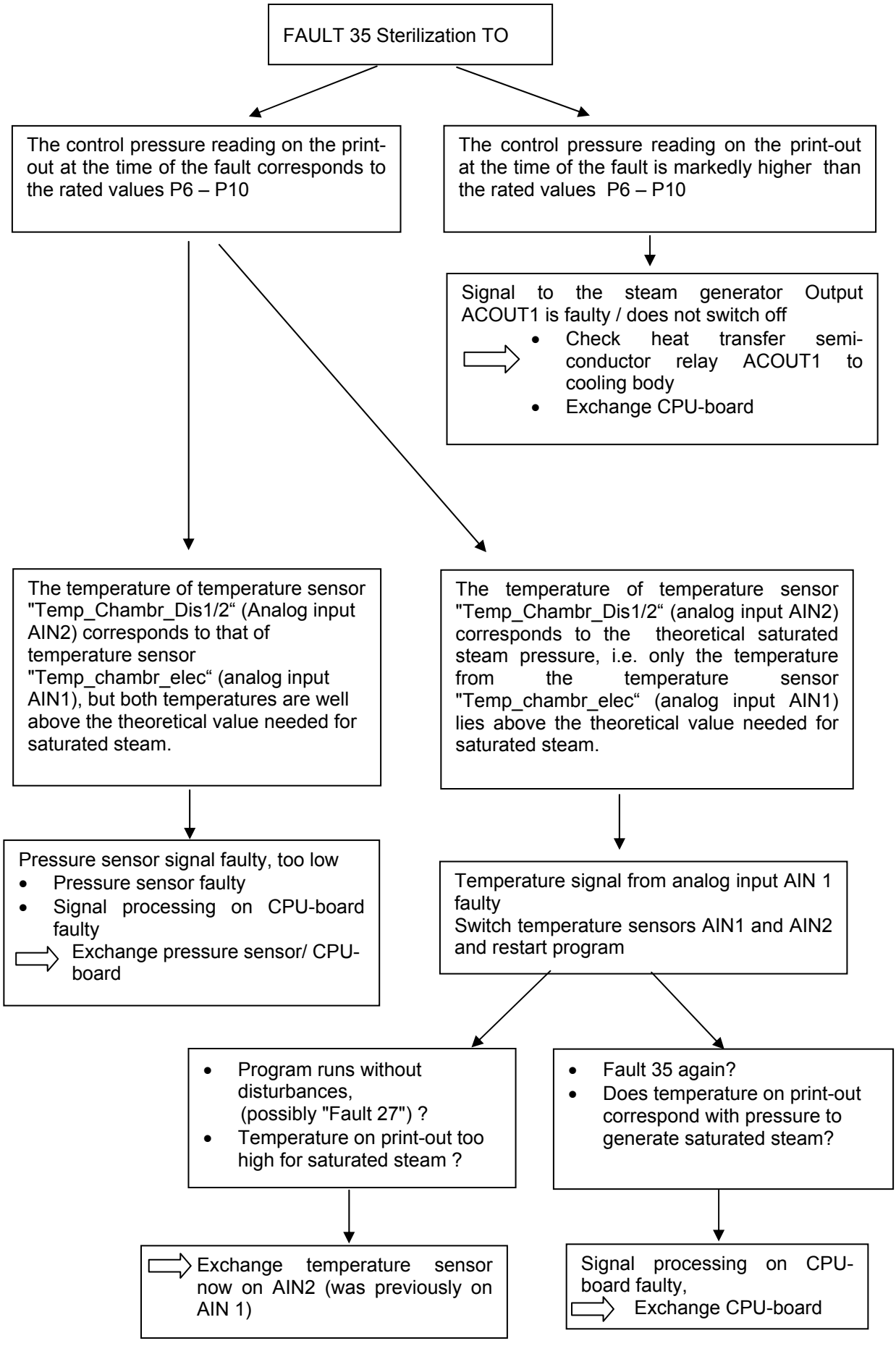
- Exchange pressure sensor
- If there is still a fault, exchange the CPU-board

► Control for steam generator output ACOUT1 faulty

Check using the program print-out records / test voltage at output ACOUT1:
⇨ In comparison with the control pressures P 6 – P10 pressure reading on print-out are too high
Pressure reading on print-out corresponds to the control pressures P 6 – P10
Print-out readings from temperature sensor "Temp_chambr_elec“ (AIN1) and from temperature sensor "Temp_Chambr_Dis1/2“ (AIN2) correspond to one another, but both are too high to produce saturated stream
Voltage at ACOUT1 does not switch off during the control process:

- Check heat transition semi-conductor relay ACOUT1 to cooling body
- Exchange the CPU board

Fault diagnosis using the program print-out


FAULT 35 Sterilization TO
The control pressure reading on the print-out at the time of the fault corresponds to the rated values P6 – P10
The control pressure reading on the print-out at the time of the fault is markedly higher than the rated values P6 – P10
Signal to the steam generator Output ACOUT1 is faulty / does not switch off
Check heat transfer semi-conductor relay ACOUT1 to cooling body
Exchange CPU-board
The temperature of temperature sensor "Temp_Chambr_Dis1/2“ (Analog input AIN2) corresponds to that of temperature sensor "Temp_chambr_elec“ (analog input AIN1), but both temperatures are well above the theoretical value needed for saturated steam.
The temperature of temperature sensor "Temp_Chambr_Dis1/2“ (analog input AIN2) corresponds to the theoretical saturated steam pressure, i.e. only the temperature from the temperature sensor "Temp_chambr_elec“ (analog input AIN1) lies above the theoretical value needed for saturated steam.
Pressure sensor signal faulty, too low
Pressure sensor faulty
Signal processing on CPU-board faulty
Exchange pressure sensor/ CPU-board
Temperature signal from analog input AIN 1 faulty
Switch temperature sensors AIN1 and AIN2 and restart program
Program runs without disturbances, (possibly "Fault 27") ?
Temperature on print-out too high for saturated steam ?
Fault 35 again?
Does temperature on print-out correspond with pressure to generate saturated steam?
Exchange temperature sensor now on AIN2 (was previously on AIN 1)
Signal processing on CPU-board faulty,
Exchange CPU-board

FAULT 37: Sterilization PO

Triggered by:
The measured pressure gives a calculated value for the temperature required for saturated steam that lies above the maximum temperature (T1-T5)+D5 for the sterilization / disinfection during the period T1-T5

Causes / Remedy

Operating fault / Checks by personnel:

Appliance faults / Repair by technical service personnel

► Control of Steam Generator Output ACOUT1 faulty

Check the control on the basis of the program print-out records/ Check voltage at output ACOUT1:
⇨ Print-out pressure readings too high in comparison with pressures P 6 – P10
Print-out reading for temperature sensor "Temp_Kess_Prog“ (AIN1) and for temperature sensor "Temp_Chambr_Dis1/2“ (AIN2) correspond to one another, but **both** are too high for the generation of saturated steam
Voltage at ACOUT1 does not switch off during the regulation :

- Check thermal transition semiconductor relay ACOUT1 to the cooling body
- Exchange CPU-board

► Pressure sensor signal fluctuates

Check using the record print-out:
⇨ Pressure values show fluctuations, peaks above the relevant pressures P 6 – P10
Recorded temperatures from temperature sensor "Temp_chambr_elec" (AIN1) and from temperature sensor "Temp_Chambr_Dis1/2“ (AIN2) correspond to one another

- Exchange pressure sensor
- If there are further malfunction reports exchange CPU-board

► "Poor regulatory behaviour of steam generator"

Poor heat transition from the heating coil of the steam generator, particularly in the transition from the heating up phase to the sterilization phase it is possible that the temperature will exceed the theoretical sterilization temperature for short periods

⇨ Lower P6-P10 and increase D5
Exchange steam generator

FAULT 38: Sterilisation TD

Triggered by:

The maximum permissible difference D6 between the temperature value to generate saturated steam calculated on the basis of the measured pressure and the value measured by the temperature sensor "Temp_chambr_elec“ at AIN1 during the period T1-T5 was exceeded.

Cause / Remedy

Operating fault / Checks by personnel:

Overheating, in particular in the case of textile loads soiled with chemicals

Appliance fault / Repair by technical service

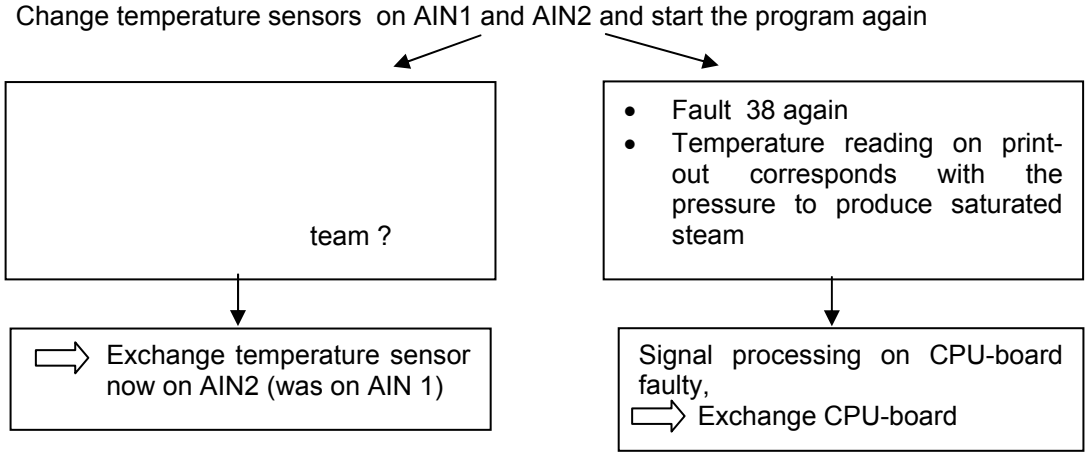
► No saturated steam pressure / Leaking

As a result of too much residual air in the autoclave chamber, the temperature is not high enough to allow the generation of saturated steam.
Check using the print-out records:
Control pressure in record corresponds to control pressures P 6 – P10
Reading in record from temperature sensor "Temp_Chambr_Dis1/2" at Analog input AIN2 is also too low (corresponds to the temperature of temperature sensor "Temp_chambr_elec" at analog input AIN1 (see last line of record print-out.)

⇨ Carry out a vacuum test

► Temperature sensor "Temp_Chambr_elec"/ Analog input AIN1 fehlerhaft

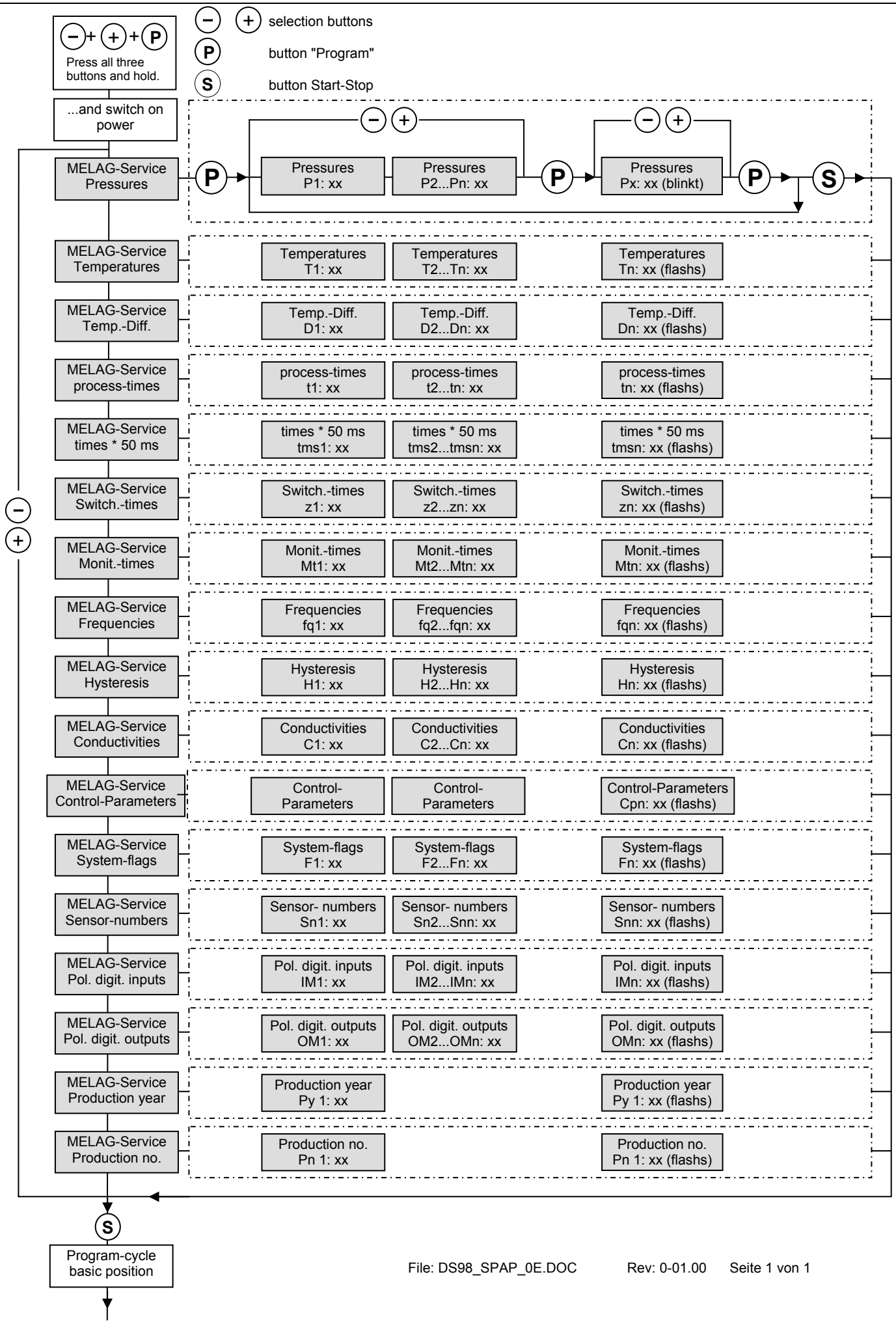
⇨ Check using the record print-out:
Print-out reading for control pressure corresponds to control pressures P 6 – P10
Print-out reading for temperature sensor "Temp_Chambr_Dis1/2“ at analog input corresponds with the pressure required for saturated steam.
In order to determine whether the fault lies in the temperature sensor or the signal processing on the CPU-board, proceed as follows:


Change temperature sensors on AIN1 and AIN2 and start the program again
team ?
⇨ Exchange temperature sensor now on AIN2 (was on AIN 1)
Fault 38 again
Temperature reading on print-out corresponds with the pressure to produce saturated steam
Signal processing on CPU-board faulty,
⇨ Exchange CPU-board

► Pressure sensor / Analog input AIN 3 measures incorrectly

If the checks show there is no leak (Vacuum test), check through the following on the program print-out::
⇨ Pressure reading on print-out corresponds to the control pressures P 6 – P10
Print-out readings from temperature sensor "Temp_Chambr_elec“ (AIN1) and from temperature sensor "Temp_Chambr_Dis1/2“ (AIN2) correspond to one another, but both are too low or too high to produce saturated stream

- Exchange pressure sensor
- If there is still a fault, exchange the CPU board


− + selection buttons
P button "Program"
S button Start-Stop
− + P
Press all three buttons and hold.
...and switch on power
MELAG-Service Pressures
Pressures P1: xx
Pressures P2...Pn: xx
Pressures Px: xx (blinkt)
MELAG-Service Temperatures
Temperatures T1: xx
Temperatures T2...Tn: xx
Temperatures Tn: xx (flashs)
MELAG-Service Temp.-Diff.
Temp.-Diff. D1: xx
Temp.-Diff. D2...Dn: xx
Temp.-Diff. Dn: xx (flashs)
MELAG-Service process-times
process-times t1: xx
process-times t2...tn: xx
process-times tn: xx (flashs)
MELAG-Service times * 50 ms
times * 50 ms tms1: xx
times * 50 ms tms2...tmsn: xx
times * 50 ms tmsn: xx (flashs)
MELAG-Service Switch.-times
Switch.-times z1: xx
Switch.-times z2...zn: xx
Switch.-times zn: xx (flashs)
MELAG-Service Monit.-times
Monit.-times Mt1: xx
Monit.-times Mt2...Mtn: xx
Monit.-times Mtn: xx (flashs)
MELAG-Service Frequencies
Frequencies fq1: xx
Frequencies fq2...fqn: xx
Frequencies fqn: xx (flashs)
MELAG-Service Hysteresis
Hysteresis H1: xx
Hysteresis H2...Hn: xx
Hysteresis Hn: xx (flashs)
MELAG-Service Conductivities
Conductivities C1: xx
Conductivities C2...Cn: xx
Conductivities Cn: xx (flashs)
MELAG-Service Control-Parameters
Control-Parameters
Control-Parameters
Control-Parameters Cpn: xx (flashs)
MELAG-Service System-flags
System-flags F1: xx
System-flags F2...Fn: xx
System-flags Fn: xx (flashs)
MELAG-Service Sensor-numbers
Sensor- numbers Sn1: xx
Sensor- numbers Sn2...Snn: xx
Sensor- numbers Snn: xx (flashs)
MELAG-Service Pol. digit. inputs
Pol. digit. inputs IM1: xx
Pol. digit. inputs IM2...IMn: xx
Pol. digit. inputs IMn: xx (flashs)
MELAG-Service Pol. digit. outputs
Pol. digit. outputs OM1: xx
Pol. digit. outputs OM2...OMn: xx
Pol. digit. outputs OMn: xx (flashs)
MELAG-Service Production year
Production year Py 1: xx
Production year Py 1: xx (flashs)
MELAG-Service Production no.
Production no. Pn 1: xx
Production no. Pn 1: xx (flashs)
Program-cycle basic position